

REMARKS

By this amendment, Applicants have amended claims 8 and 10 to more clearly define their invention. In particular, claim 8 has been amended to use the transistional phrase "comprising" to clarify that the coating solution is "open" to unrecited elements. Claim 8 has also been amended to correct the informality noted by the Examiner in numbered section 1 of the Office Action, i.e., to give antecedent basis to the phrase "the [at least] metallic element." Claim 8 has also been amended to indicate that the at least one metallic element is incorporated as a catalyst component. Formatting changes have also been made to claims 8 and 10.

Applicants have also added claims 12-20 to define further aspects of the present invention. See, e.g., page 12, lines 2-27 of Applicants' specification.

In view of the foregoing amendments to claim 8, reconsideration and withdrawal of the objection to claim 8 in numbered section 1 of the Office Action are requested.

Claims 8-10 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 5,954,866 to Ohta et al. Applicants traverse this rejection and request reconsideration thereof.

The elected invention relates to a coating solution for producing ceramic tubes. The solution includes at least one element selected from the group consisting of C, Ti, Zn, Sn, Al and a rare-earth element, a Cu compound, at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as a catalyst component, and an organic material containing C, N and O bound to the at least one metallic element. Applicants have found that such a coating solution can be used to produce ceramic tubes by a simple production method.

The patent to Ohta et al. relates to ink for ink jet recording. The ink composition disclosed therein includes a pigment as a colorant, an anionic surfactant having a polyoxyethylene group, a dispersant, and water. Such an ink composition is disclosed to be used to record an image on a recording medium having a layer comprising a water-soluble resin by ink jet recording. In comparing the present invention to Ohta et al., the Examiner refers to a "coating solution" and mixes elements of the water-soluble resin layer on the recording medium with elements of the ink-composition. For example, the water-soluble resin disclosed at column 3, lines 10 and 11 of Ohta et al. is present on the recording medium. On the other hand, the carbon black, the copper compound and the element comprising iron disclosed at column 4, lines 60-64 of Ohta et al. are in the ink composition. Thus, the "coating solution" to which the Examiner refers in the second paragraph of numbered section 3 of the Office Action is not described in Ohta et al.

While the ink composition of Ohta et al. can include a polymer dispersant and an anionic surfactant, the Ohta et al. patent does not relate to a coating solution for producing ceramic tubes and does not disclose a solution including at least one element selected from the group consisting of C, Ti, Zn, Sn, Al and a rare earth element, a Cu compound, at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as a catalyst component, and an organic material containing C, N, O bound to the at least one metallic element. Accordingly, the Ohta et al. patent does not disclose the presently claimed invention.

In view of the differences between Ohta et al. and the present invention, it is submitted it would not have been obvious to modify the teachings of Ohta et al. to arrive at the presently claimed invention.

More particularly, the present invention relates to a coating solution for producing ceramic tubes used for electronic devices, battery parts, catalysts and magnetic materials, etc.. One conventional method for producing ceramic tubes by using a vacuum arc evaporation source has involved problems that a carbon nano-tube yield is low, it is very time-consuming, and its production cost is very high. The present invention provides a coating solution which can be used, e.g., to simply produce ceramic tubes by a pyrolysis process in a good yield.

In the production of ceramic tubes, a catalyst component and a hydrocarbon as a carbon component may be used. However, the pyrolysis process thermally treats a coating solution spread on a substrate, which tends to limit organic materials as the carbon source and makes it difficult to produce ceramic tubes. Such a process produces ceramic tubes in a low yield and an uneven film, because the organic material it uses evaporates when pyrolyzed, and the resulting gases not contacting with the catalyst are released out of the system without being treated, leaving part of the gases to be formed into carbon nano-tubes on the catalyst. Therefore, the coating solution of the present invention includes an organic/inorganic hybrid with a catalyst component bound to the organic material molecules as the carbon source. That is, the coating solution of the present invention has the feature that an organic material is bound to at least one metallic element selected from the group consisting of Fe, Co, Pt, Ru, Pd and La as the catalyst component. The present inventors found for the first time that such a coating solution, when spread on a substrate and pyrolyzed, gives carbon nano-tubes in a high yield and a uniform film, because the catalyst component is uniformly dispersed and comes into contact with the carbon source.

In contrast, the Ohta et al. patent discloses an ink composition for an ink jet

recording ink containing iron oxide, copper oxide, carbon black as a pigment component. The technical field of Ohta et al. is quite different from that of the present invention in that Ohta et al. is directed to an ink composition for an ink jet recording while the present invention is directed to a coating solution for producing ceramic tubes. Additionally, the purpose of Ohta et al. is also quite different from that of the present invention in that the purpose of Ohta et al. is provide an ink composition which can form a high quality image on a recording medium having a layer containing a water-soluble resin.

Moreover, the Ohta et al. patent does not disclose the technical concept of the present invention that ceramic tubes can be produced in a good yield by binding an organic material as a carbon source to a metallic element as a catalyst component in a coating solution for producing ceramic tubes. Thus, a person of ordinary skill in the art would not have been motivated to obtain the coating solution for producing ceramic tubes of the present invention in view of Ohta et al. which does not suggest at all that the ink composition can be used as a coating solution for producing ceramic tubes.

For the foregoing reasons, it is submitted it would not have been obvious to modify the teachings of Ohta et al. to arrive at the presently claimed invention.


For the foregoing reasons, favorable reconsideration and allowance of claims 8-10 and 12-20 are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 500.43624X00),
and please credit any excess fees to such deposit account.

Respectfully submitted,

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